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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/606,992 | 06/25/2003 | Dan Daeweon Cheong | 356828001US1 | 4507 |

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| EXAMINER | |
|---|---|
| LIN, JAMES | |
| ART UNIT | PAPER NUMBER |
| 1762 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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| 3 MONTHS | 02/22/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/606,992 | CHEONG, DAN DAEWEON | |
| | Examiner | Art Unit | |
| | Jimmy Lin | 1762 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *31 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *24-26,28-44 and 46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-26,28-44 and 46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/6/06 has been entered.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 24-26 and 28-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support for "placing first and second coating rate monitors closer to said substrate than to said first and second sources" (claim 24). An explanation is given in the "Response to Arguments" section below.

There is no support for "wherein controlling stoichiometry of said vaporized components includes controlling temperatures of the first and second sources" (claim 26). The specification seems that the control of stoichiometry during deposition is effected using two or more deposition sources with different chemical compositions (pg. 7, lines 10-16), but never mentions anything about controlling the temperature.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 24, 26, 33, 37, 41-42, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKee et al. (U.S. Patent 5,906,857) in view of Forbes et al. (U.S. Patent 6,255,156).

McKee teaches a method of depositing a thin film of a pre-determined composition onto a substrate, said composition comprising a ternary composition (Col. 9, lines 22 – 41), the method comprising:

placing a first and second deposit at a first and second source of vaporization in a vapor deposition apparatus;

simultaneously effecting vapor deposition of the components from the first and second deposits onto the first and second coating rate monitors, respectively, and also onto the substrate (Col. 9, lines 22 – 57);

placing first and second coating rate monitors (84) adjacent to the substrate, the first coating rate monitor shielded from the second source but open to the first source, and the second coating rate monitor shielded from the first source but open to the second source;

independently measuring rates of deposition of the components onto the first and second coating rate monitors (Figs. 1, 3, and 10, Col. 10, lines 42 – 53);

determining temporal variation of the deposition of the components based on independently measured rates of deposition (Col. 2, lines 15 – 30);

McKee does not teach controlling the stoichiometry of the vaporized components using the feedback control. However, McKee teaches that the temperature of the source can be adjusted based on the measured variances of the deposition rate to achieve a uniform film (Col. 10, lines 59 – 65, Col. 4, lines 11 – 30), thereby providing a feedback control of monitoring the deposition. Forbes teaches that it is well known in the art of chemical vapor deposition that the rate of vaporization of the sources can be adjusted to achieve the desired stoichiometry (Col. 5, line 62 – Col. 6, line 3). The method of McKee would have necessarily controlled the rate of vaporization because McKee teaches that the temperature source is adjusted, as discussed above.

The temperature of the source directly affects the rate of vaporization. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have adjusted the rate of vaporization of the sources to control the stoichiometry. One would have been motivated to do so in order to deposit a film with the desired composition ratio.

McKee and Forbes do not explicitly teach that the first and second coating rate monitors are closer to said substrate than to said first and second sources. However, one of ordinary skill in the art would have recognized that the distance from the coating rate monitor to the source material does not effect the deposition. For example, deposition would be the same whether 1) the body portion 40 (Fig. 3 of McKee) is elongated such that the coating rate monitors are closer to the substrate than the sources or 2) the body portion is short such that the coating rate monitors are closer to the sources than the substrate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a body portion of McKee having various lengths, including the claimed configuration, with a reasonable expectation of success because one of ordinary skill in the art would recognize that the relative distance of the sources to the coating rate monitor and the substrate is not critical.

Claim 26: McKee teaches that the temperature of the sources can be adjusted to control the rate of deposition, and Forbes teaches that the stoichiometry can be controlled by the rate of vaporization.

Claim 33: McKee teaches that a third deposit is placed at a third source, wherein the components of the third deposit form part of the composition (Figs. 1 and 10, Col. 9, lines 22 – 41).

Claims 37, 41: McKee teaches that the vapor deposition can be carried out by sputtering and thermal evaporation (Col. 1, lines 12 – 19).

Claim 42: The temperature of the sources can be controlled, as discussed above.

Claim 46: McKee teaches that homogenous layers of AC and BC are formed (Fig. 11). The y-axis of the graph refers to deposition sources A, B, and C. The graph as a whole indicates when and for how long the shutter for each source is open. The open shutter state of C always overlaps with the open shutter state of either A or B, thus forming homogenous layers.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over McKee '857 in view of Forbes '156 as applied to claim 24 above, and further in view of Chow et al. (U.S. Patent 5,882,773).

McKee teaches a rate monitor that measures the rate of deposition, wherein the temperature of the source can be adjusted accordingly, but does not teach using a crystal rate monitor. However, Chow teaches that a crystal rate monitor can measure the deposition rate in the method of vapor deposition and that the temperature of the source can be adjusted depending on the deposition rate (Col. 5, lines 1 – 11). The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a crystal rate monitor as the particular rate monitor of McKee because Chow teaches that such as rate monitor can be used to measure the rate of deposition.

7. Claims 24, 28 – 30, and 32 – 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus et al. (U.S. Patent 5,505,986) in view of McKee '857, and Forbes '156.

Velthaus et al. teaches a method for the deposition of a thin film of a pre-determined composition onto a substrate, the composition comprising a ternary, quaternary, or higher composition, the composition being a phosphor film such as those claimed by the applicant comprising providing multiple thermal evaporation, sputtering, CVD, etc. sources containing different deposits each having components of the film in a vapor deposition apparatus and simultaneously evaporating the materials to form the composition on the substrate (Abstract, Figure 2, Col. 2, line 39 – Col. 4, line 33). Velthaus describes controlling the rate of evaporation or flux from each evaporator by controlling the temperature of the evaporators (Col. 3, lines 1 – 10).

Velthaus does not explicitly teach the steps of independently monitoring the rate of deposition and determining the temporal variation of the deposition based on the independently measured rates of deposition. However, McKee teaches such limitations as discussed above. McKee also teaches that controlling the temperature of the sources along with using a shutter

system provides a more rapid response than controlling flux by temperature alone and also provides a more uniform film (Col. 1, lines 25 – 40, Col. 2 lines 15 – 30). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used the monitoring and control system of McKee to control the evaporation. One would have been motivated to do so in order to provide a quicker response than can be achieved using only temperature control as taught by Velthaus and to improve film uniformity.

Velthaus and McKee do not explicitly teach controlling the stoichiometry of the vaporized components. However, Forbes teaches that such is obvious in the art of vapor deposition, as discussed above.

Claims 28-30, 32, 35-36, and 38-44: McKee teaches that the method of deposition can be electron beam epitaxy (Col. 1, lines 12 – 18). Velthaus teaches depositing the phosphors of claims 43 and 44 (Col. 2, lines 61-67).

Claim 34: Velthaus teaches that the substrate can be ZnO:Al (Fig. 1, Col. 2, lines 39 – 41).

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus '986 in view of McKee '857, and Forbes '156, as applied to claim 24 above, and further in view of Chaffin (U.S. Patent 5,242,709).

Velthaus, McKee, and Forbes are discussed above, but do not explicitly teach the use of a crystal rate monitor. Velthaus teaches that the phosphor film is formed in crystalline form (abstract), and McKee teaches the measuring the rate of deposition with a rate monitor. However, Chaffin teaches that a crystal rate monitor can be used in the deposition of a phosphor film. The rate of vaporization is controlled by a crystal rate monitor, which measures the rate of crystal deposition (Example 1). The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used a crystal rate monitor to monitor the rate of crystal deposition of Velthaus.

9. Claims 30 – 31 and 38 – 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Velthaus '986 in view of McKee '857, and Forbes '156, as applied to claim 24 above, and further in view of Fuyama et al. (U.S. Patent 4,857,802).

Velthaus, McKee, and Forbes are discussed above, but do not explicitly teach the deposition of a dielectric layer such that a phosphor is deposited juxtaposed to the dielectric layer. However, Velthaus teaches a $Si_3N_4$ dielectric layer below the phosphor layer (Fig. 1, Col. 2, lines 39 – 60) but is silent as to how the dielectric layer is deposited. Fuyama teaches a method of depositing a dielectric layer for an EL device, wherein the dielectric layer is a multi-component composition such as $SrTiO_3$, $PbTiO_3$, and $BaTiO_3$ is sputtered onto the substrate (abstract). Fuyama teaches that dielectric films such as $Si_3N_4$ has a low dielectric constant, thereby requiring a very high driving voltage for emitting the light-emitting layer. The preferred dielectric layers would lower the driving voltage in the EL device (Col. 1, line 56 – Col. 2, line 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used the dielectric layers of Fuyama in the device of Velthaus while utilizing the monitoring/controlling method of McKee because Fuyama teaches that the preferred dielectric films will allow for a lower driving voltage, thereby extending the life of the EL device.

***Response to Arguments***

10. Applicant's arguments filed 1/31/2007 have been fully considered but they are not persuasive.

Claims 24-26 and 28-44 as rejected under 35 U.S.C. 112, second paragraph:

The Applicant argues on pgs. 8-9 that the specification supports the newly added limitation of "closer to said substrate than to said first and second sources" (claim 24). In particular, the Applicant argues that A) the specification discloses that the "location of [the] crystal rate monitors 16 and 22 [is] spaced from [the] source materials 12 and 14 but close to [the] substrate 18", B) the specification discloses that the crystal rate monitors are "as near as practical" to the substrate, and C) Figure 1 clearly shows the crystal rate monitors positioned closer to the substrate than to the source materials. In regards to A), the term "spaced" does not provide a relative distance because the crystal rate monitors are also "spaced" from the substrate

even though the specification teaches that the rate monitors are close to the substrate. Objects not in physical contact must necessarily have a space between them and, thus, are spaced. In regards to B), the term "proximate" alone does not suggest that the rate monitors are closer to the substrate than the source materials because the cited lines does not mention anything about the distance relative to the source materials. In regards to C), proportions of features in drawings are not evidence of actual proportions when drawings are not to scale (see MPEP 2125). For at least these reasons, the specification does not provide support for the newly added limitation mentioned above.

Claims 24, 26, 33, 37, 41, and 42 as rejected over KcKee '857 and Forbes '156:

The Applicant argues on pgs. 10-11 that the combination of references do not teach or suggest "placing first and second coating rate monitors closer to said substrate than to said first and second sources". However, this limitation is addressed in the rejection above.

The Applicant argues on pg. 11 that the deposited layer of McKee is heterogeneous in an atomic scale while Forbes discloses forming a homogenous layer. However, the Applicant is directed to Fig. 11 of McKee. The y-axis of the graph refers to deposition sources A, B, and C. The graph as a whole indicates when and for how long the shutter for each source is open. The open shutter state of C always overlaps with the open shutter state of either A or B. Therefore, the deposited layers of McKee at least have homogenous AC and BC layers.

Newly added claim 46:

The Applicant argues on pgs. 13-14 that the cited references do not disclose or suggest "forming a homogenous layer of said composition on the substrate by controlling stoichiometry of said vaporized components using the independently measured rates of deposition of said components onto the first and second crystal rate monitors as feedback". However, the limitation of "homogeneous" is discussed immediately above.

***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is 571-272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JL
JL

KEITH HENDRICKS
PRIMARY EXAMINER